CalCOFI Future Directions

presented by

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California Cooperative Oceanic Fisheries Investigations (CalCOFI) is a marine fisheries research partnership with a long and productive history. The focus of this partnership has been to examine links between oceanographic observations of the California Current system with the distribution and abundance of marine organisms, such as phytoplankton, zooplankton and ichthyoplankton. Over time, an invaluable physical and biological time series has been created which has been used to describe the relationship between changes in the abundance of marine organisms in responses to changes in ocean conditions. The three core members of the CalCOFI program since 1951 have been Scripps Institution of Oceanography, National Marine Fisheries Service, and the California Department of Fish and Game (CDFG).

There is now a need to discuss the goals that each of the partners have to re-evaluate the direction of the program, explore ways to expand the program, and chart the course for the next 50 years.

Recent Developments in CDFG

The Marine Region of the CDFG is responsible for protecting and managing California's marine resources under the authority of laws and regulations created by the State Legislature, along with the Fish and Game Commission, NMFS, and the Pacific Fisheries Management Council (PFMC). The Marine Region of CDFG was established in November 1997, as an outgrowth of planning actions taken in the mid_1990s to increase its effectiveness. A task force, which convened in 1997, developed recommendations for the establishment of a new Marine Region. This reorganization was a break from the old structure in which each marine area was a portion of it's terrestrial partner. This new region was in part spurred on by a growing awareness in the state of the link between the states economic well being and the health of the ocean environment.

Along with the reorganization of the Marine Region came changes in management authority whereby the legislature granted more management authority to the Fish and Game Commission. For a list of marine fisheries managed by the state go to the web site master plan at http://www.dfg.ca.gov/mrd/masterplan/pdfs/appendix_d.pdf. The Commission has been involved in the management of California's resources since 1870. It is a 5 member body appointed by the Governor for 6 year terms and there are eight commission support staff. At this time two of the five seats are vacant. The Commission meets at least eleven times each year to publicly discuss various proposed regulations, permits, licenses, management policies and other subjects within it's areas of responsibility. The CDFG also interacts with the PFMC and the manager of the marine region sits on the council.

Since the creation of the marine region and new powers for the Fish and Game Commission sweeping legislative changes have occurred exemplified by the Marine Life Management Act which was signed into law in late 1998 by Governor Wilson. The major tenants of this

legislation are that marine resources must be managed for sustainability by CDFG. This act gives the state new responsibilities to manage and conserve nearshore species and their habitats. The foundation of this management is to be based on state of the art fishery science. This mandate promotes research on marine ecosystems that will aid management decisions.

The Marine Life Management Act provides that fishery management plans shall outline the goals and methods for managing the state's marine fisheries. A draft of the Nearshore Fishery Management Plan has been completed for 19 nearshore finfish species. At this time, the CDFG is heavily involved in the drafting of Fishery Management Plans for a number of species including abalone, squid, and white seabass. In this work the department is actively engaged in compiling existing data on target species. These data are of two types: fishery dependent information and fishery independent. This new directive has precipitated the creation of teams within CDFG that are focused on the drafting of Fishery Management Plans.

Constituent feedback on these plans from peer reviewers, science panels, fishers, interested parties and the public at large is encouraged and mechanisms for participation have been built into the management process. The drafting of Fishery Management Plans is designed to be an open process with active participation by all interested parties. The CDFG will seek to build participation in the management of marine resources. Socio-economic considerations will be taken into account in the management of marine resources in California as outlined in the legislation.

This legislation also seeks to implement adaptive management of marine resources such that changes and improvements can be made over time to react to unanticipated responses to management decisions by either the resource or fishers. By having adaptive management built into the Act this also allows for modifications in management in the face of environmental change in time and space.

New legislation has also been enacted which will establish a series of Marine Protected Areas in California under the Marine Life Protection Act. This act seeks to streamline the existing system of Marine Protected Areas by establishing 3 designations: State Marine Reserves, State Marine Parks and State Marine Conservation Areas. Commercial and recreational take are restricted from marine reserves while conservation areas have the fewest restrictions. This process is committed to designing a network of marine reserves throughout the state to maintain and protect marine resources. To that end, CDFG is involved with the public and peer reviewers to establish marine reserves. For the most up to date information on this dynamic process see the web page at http://www.dfg.ca.gov/mrd/mlpa/.

Traditional and Future Directions

The CDFG has traditionally focused on collecting and maintaining fishery dependent information. This has been one of the strengths of the department and remains an area in which the department is committed. The department has port samplers and is an active partner with Pacific States Marine Fisheries Commission forming a network of port samplers along the west coast which are available to collect information on commercial and recreational fishing (RecFIN) http://www.psmfc.org/recfin/. Samplers may also be available for collaborative research

projects. CDFG has collected species specific data in a spatially explicit way, such that species specific landings can be tied to CDFG blocks (10 x 10 min blocks). Data include landings, area catch, species, vessel, date, port, gear, price. Additional information has also been collected from the fishery including size frequency of catch, landings composition (bycatch), otoliths, diet composition, tissue samples etc. Much of this data is available on CDFG's new Oracle-based data system called the Commercial Fisheries Information System. Currently, Joann Eres is the supervisor of these data. The CDFG is now actively looking at ways to improve this system of collecting fishery dependent information.

The marine region has developed a GIS program to compile and display fishery information. In this way relevant information layers can be assembled to aid in the management and conservation of marine resources in the state. The department is partnering with other agencies and research groups statewide to map much of the critical nearshore rocky habitats which support marine resources in a marine mapping user group. With this information researchers and managers will be better able to assess populations, their habitat, and potential habitat associations. Disparate sources of information such as physical parameters, kelp abundance, and shorebird nesting locations can be complied for use by marine resource managers.

A need has been identified for a coordinated monitoring of nearshore benthic resources along the coast. The department has taken the lead to develop partnerships to assemble a Nearshore Resources Cooperative Monitoring Group. This group is focusing on diver and video based surveys to monitor fished population in nearshore rocky habitats. This group is also interested in expanding the participation to include other types of fishery independent sampling such as trawl surveys and plankton surveys. This process began in early 2001 and has initiated dialog between groups that monitor the subtidal. This program will be a fishery independent component of future stock assessment work.

CalCOFI

CalCOFI has been a pioneer in the exploration of the ways in which changes in El Niño events impact marine resources (Mullin 2000). Today it is well known that the changes in the climate-ocean had major impacts on the marine ecosystem (McGowan et al. 1998).

CalCOFI has been a source of fishery independent information for many of the fisheries that CDFG manages. Now and in the past CDFG and the National Marine Fisheries Service have relied on CalCOFI abundance information for fish larvae particularly for coastal pelagic species. For example, the Pacific sardine management plan utilizes an index of sardine egg abundance generated from the CalCOFI data as well as an egg production index also using CalCOFI data in it's stock assessment models (Conser et al. 2000). They also use information gathered from CalCOFI which shows that the productivity of this species increases when relatively warm-water conditions persist in the harvest guideline equation (Conser et al. 2000). Long-term, fishery independent data sets are vital to stock assessment methods, especially those that start before fisheries and span major regime shifts such as the CalCOFI data set (Moser at el. 2001).

Mandates to draft Fishery Management Plans have served as a foci for the compilation of both fishery dependent and fishery independent data sets. The Nearshore fishery plan has benefitted

from recent publications in the CalCOFI journal examining the abundances of larval fishes over time as they relate to fishing and oceanographic conditions (Moser et al 2000, Moser et al. 2001). Bocaccio and cowcod have been shown to have suffered major declines during the warm water phase of the California Current (Moser et al. 2000). Trends in cabezon landings for example follow trends on CalCOFI larval indices supporting the use of CalCOFI larval data as fishery independent indices of abundance (Moser et al. 2001). These publications are extremely valuable as they are one of the few sources of long-term fishery independent information for many of the species of concern.

The CalCOFI program has been expanded to look at new species in the last few years through a partnership with the National Marine Fisheries Service and the squid industry to look at squid paralarvae. Squid are now a major fishery in California with ex-vessel landing values of $26 million in comparison with Pacific sardine which was worth $6.3 million in 2000. Other major fisheries requiring fishery management plans and fishery independent information could also benefit from an expansion of the species quantified by CalCOFI. For example, little is known about the distribution and abundance of sea urchin larvae (echinoplutei). This fishery has been one of the leading fisheries in the state for the past decade and continues to be worth $13 million despite sharp declines in landings. TENERA has a time series on the abundance of this important species at one location which shows that they can be sampled in nets of 200 um mesh and can be distinguished from other species of sea urchins due to unique larval features. This and other species not tracked in the current CalCOFI time series such as sea cucumber larvae (pentactula) would benefit from an expansion of the program as has been done successfully for squid.

Potential Future Directions of CalCOFI

1. CDFG considers the continuation of the invaluable time series maintained by CalCOFI over it's current spatial range as the highest priority for the program in the next 50 years.

2. CDFG considers many of the technical innovations that have already been made within the CalCOFI program as very positive. For example, observations made with a continuous underway fish egg sampler have provided greater spatial resolution of patterns in marine fish spawning. The installation of the optical plankton counter which helps determine the size spectrum and/or depth distribution of the plankton is a welcome addition to the program. The continued development and implementation of novel advancements in oceanic observations and marine resource sampling is needed.

3. CDFG considers the expansion of the sampling program off northern Baja California, Mexico by IMECOCAL as a very positive step.

4) The multi-institutional nature of the program is a key feature which allows the program to do more than any of it's partners could do alone. Given this background and the history of the program we will now look forward to explore ways in which the program may be expanded.

5) CDFG considers exploration of sampling north of the current grid pattern and the central California coast as a worthwhile goal to help put the CalCOFI time series into a larger regional context. Northern expansion is supported by in-depth analyses of the ichthyoplankton time series (Moser et al. 2001).

6) Observations made at nearshore stations and in kelp forest communities are of particular relevance to CDFG since many of these species are exploited. Nearshore areas may respond in similar or unique ways to changes in the oceanic conditions compared with the CalCOFI time series observations.

7) Expansion of the species quantified in the current sampling stations.

8) There is a need for coast-wide integration and management of future databases which would be accessible on the web. The current CalCOFI database could be used as a model.

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